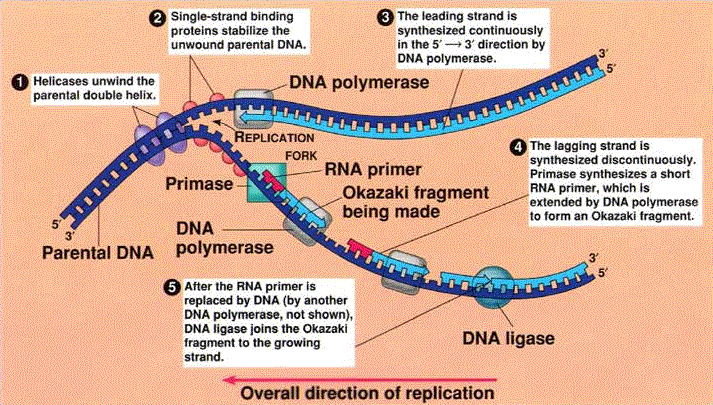
Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_

**DNA Replication Worksheet**

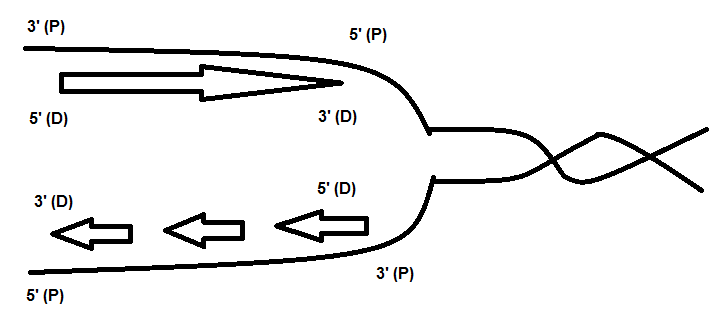
Ms. Ottolini, PreAP Biology

***Summary Image:*** *Write in the letter that corresponds to the steps missing from the diagram next to the appropriate number.*

|  |  |
| --- | --- |
| **Letter** | **Step Description** |
| A | Helicase unwinds the parent double helix. |
| B | The leading strand is synthesized continuously INTO the replication fork as DNA polymerase brings in free nucleotides and builds the new strand in the 5’ to 3’ direction. *(Note: This means that DNA polymerase “reads” the parent strand in the 3’ to 5’ direction.)* |
| C | The lagging strand is synthesized in “chunks” OUT OF the replication fork as primase brings in short tags / primers to start each chunk and DNA polymerase brings in free nucleotides and builds the new strand in the 5’ to 3’ direction. |
| D | DNA ligase joins the chunks (aka Okazaki fragments) of the lagging strand together to create a complete, continuous strand. |

**

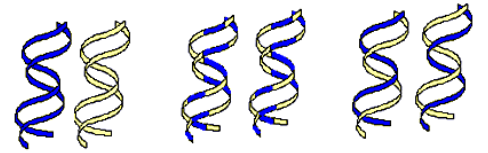
***Leading vs. Lagging Strand Images:*** *Answer the questions on the next page that refer to the image below. In the image, a parent DNA double helix is unwinding. The 5’ and 3’ ends of each parent DNA strand are indicated with a (P). The arrows indicate the direction of synthesis of each daughter DNA strand. The 5’ and 3’ ends of each daughter strand are indicated with a (D).*

**

1. In the image shown at the bottom of the previous page, which daughter DNA strand is the leading strand? Which one is the lagging strand? How do you know?
2. Why must the lagging strand be created in chunks (Okazaki fragments)? Use the terms replication fork, 5’, and 3’ in your response.

***Models of DNA Replication Images:*** *Initially, scientists proposed three hypotheses to explain how daughter DNA is synthesized from parent DNA. A description of each hypothesis is given below.*

* *The* ***Semiconservative Replication Hypothesis*** *says that the two double helices produced will each have a parent DNA strand and a daughter DNA strand.*
* *The* ***Conservative Replication Hypothesis*** *says that the two double helices produced will include the intact parent DNA molecule and a completely new daughter DNA double helix is created.*
* *The* ***Dispersive Replication Hypothesis*** *says that the two double helices produced will include “chunks” of parent and daughter DNA in each strand.*



1. From what you have learned about DNA replication, which hypothesis is correct?
2. Which picture shown above represents this correct hypothesis? Circle the picture above, and give an explanation for your choice in the space below.

***Complementary Base Pairing During Replication:*** *Below, you have been given two parent DNA strands that have already been separated by the enzyme helicase. Fill in the correct bases—adenine, thymine, cytosine, and guanine—that match with the bases on each parent strand in the vertical boxes representing each daughter strand.*